Ordering number: EN3100A



No.3100A

CMOS LSI

LC7230-8272

Single-Chip PLL Controller

Overview

The LC7230-8272 is a PLL, LCD driver-contained electronic tuning-use single-chip microcontroller designed for reception of LW/MW/SW/FM bands in the U.S.A., Europe, Japan and South Africa.

1. Functions and Features

(1) Receiving frequency

Area	Band	Receiving Frequency Range FM (MHz) Others (kHz)	Reference Frequency (kHz)	Step (kHz)	IF FM (MHz) Others (kHz)	Diode Matrix $B_2B_1B_0$
JAPAN	FM	76.0 to 90.0	50	100	−10.7	1 0 0
	MW	531 to 1611	9	9	450/468	
		(531 to 1629)	(9)	(9)	(↑)	
USA	FM	87.9 to 107.9	50	200/100	10.7	0 0 0
	MW	530 to 1610	10	10	450	
		(530 to 1720)	(10)	(10)	(↑)	
	FM	87.9 to 107.9	50	200/100	10.7	1 1 1
	MW	522 to 1611	9	9	450/468	
		(522 to 1719)	(9)	(9)	(↑)	
EUROPE	FM	87.50 to 108.00	25	50	10.7	0 0 1
	MW	531 to 1602	9	9	450/468	
		(522 to 1611)	(9)	(9)	(↑)	
	LW	153 to 281	1	1	450/468	
		(146 to 290)	(1)	(1)	(↑)	
	FM	87.50 to 108.00	25	50	10.7	0 1 0
	MW	531 to 1602	9	9	450/468	
		(522 to 1611)	(9)	(9)	(↑)	
	LW	153 to 281	1	1	450/468	
		(146 to 290)	(1)	(1)	(↑)	
	SW	SW1 5800 to 7300	5	5	450	
		SW2 9500 to 18000				
	FM	87.50 to 108.00	25	50	10.7	0 1 1
	MW	531 to 1602	9	9	450/468	
		(522 to 1611)	(9)	(9)	(↑)	
	LW	153 to 281	1	1	450/468	
		(146 to 290)	(1)	(1)	(↑)	
	SW	SW1 3200 to 7300	5	5	450	
		SW2 9500 to 18000	5	5	↑	
S.AFRICA	FM	87.50 to 108.00	25	50	−10.7	1 1 0
	MW	531 to 1602	9	9	450/468	
		(522 to 1611)	(9)	(9)	(↑)	
	LW	153 to 281	1	1	450/468	
		(146 to 290)	(1)	(1)	(↑)	
	FM	87.50 to 108.00	25	50	−10.7	1 0 1
	MW	531 to 1602	9	9	450/468	
		(522 to 1611)	(9)	(9)	(↑)	
	LW	153 to 281	1	1	450/468	
		(146 to 290)	(1)	(1)	(↑)	
	SW	SW1 5800 to 7300	5	5	450	
		SW2 9500 to 18000				

Note) 1. A frequency in ( ) is selected by using diode matrix "SHIFT".
2. The presence or absence of LW and U.S.A. 200/100 are selected by using diode matrix "LW200".
3. AM IF450/468 is selected by using diode matrix.

(2) Tuning method (Sawtooth wave mode: /\/\/\ )
- Manual up/down
- Auto up/down
- Preset call by 8-button method

(3) Preset memory
FM: Mode 1 ..... 8 channels
Mode 2 ..... 8 channles
AM: (MW + LW + SW)
No distinction between mode 1 and mode 2 ... 8 channels
24 channels in all

(4) Auto preset scan

(5) Timer function
- Timer ..... Causes turn-ON mode only. Sleep timer (Set to the nearest 10 minutes.)
- Clock ..... 12/24hr mode 12hr: Japan, USA
  24hr: Europe, South Africa

(6) Usable with remote control
The LC7461M-8103 is used.

(7) Usable with electronic volume control : 7-dot LED (using the LB1417) display available
The LC7535 is used.

(8) Usable with the function switch : LCD display and LED (using the MLC74HC375) display available.
The LC7821 (N) is used.

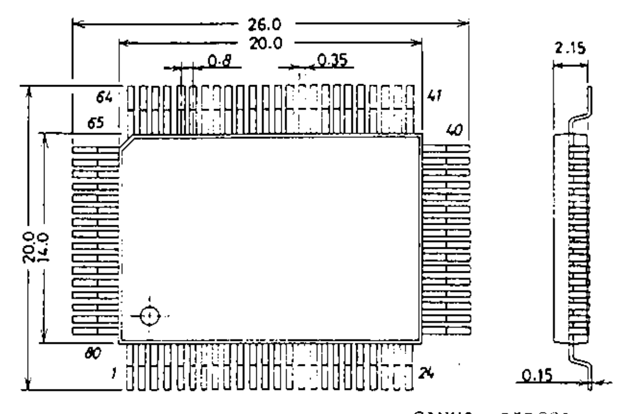
(9) On-chip LCD driver : 1/2 duty 1/2 bias frame frequency 100Hz

(10) Single 5V supply

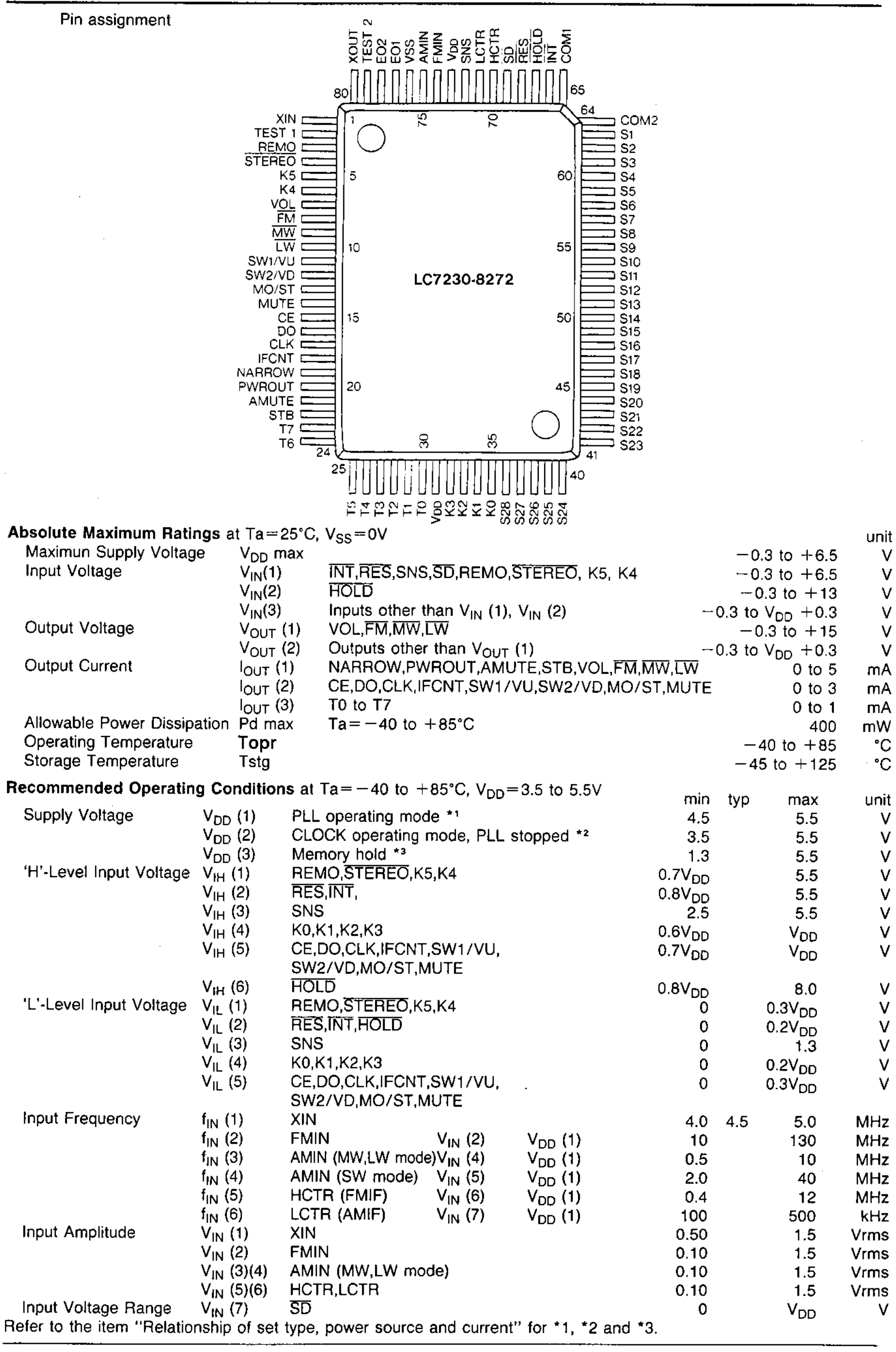
(11) Package : QIP80A

2. Package Dimensions

(unit: mm) 3044B



Pin assignment



Absolute Maximum Ratings at Ta=25°C, V_{SS}=0V

				unit
Maximun Supply Voltage	V_{DD} max		−0.3 to +6.5	V
Input Voltage	V_{IN}(1)	$\overline{INT}$,$\overline{RES}$,SNS,$\overline{SD}$,REMO,$\overline{STEREO}$, K5, K4	−0.3 to +6.5	V
	V_{IN}(2)	$\overline{HOLD}$	−0.3 to +13	V
	V_{IN}(3)	Inputs other than V_{IN} (1), V_{IN} (2)	−0.3 to V_{DD} +0.3	V
Output Voltage	V_{OUT} (1)	VOL,$\overline{FM}$,$\overline{MW}$,$\overline{LW}$	−0.3 to +15	V
	V_{OUT} (2)	Outputs other than V_{OUT} (1)	−0.3 to V_{DD} +0.3	V
Output Current	I_{OUT} (1)	NARROW,PWROUT,AMUTE,STB,VOL,$\overline{FM}$,$\overline{MW}$,$\overline{LW}$	0 to 5	mA
	I_{OUT} (2)	CE,DO,CLK,IFCNT,SW1/VU,SW2/VD,MO/ST,MUTE	0 to 3	mA
	I_{OUT} (3)	T0 to T7	0 to 1	mA
Allowable Power Dissipation	Pd max	Ta=−40 to +85°C	400	mW
Operating Temperature	Topr		−40 to +85	°C
Storage Temperature	Tstg		−45 to +125	°C

Recommended Operating Conditions at Ta=−40 to +85°C, V_{DD}=3.5 to 5.5V

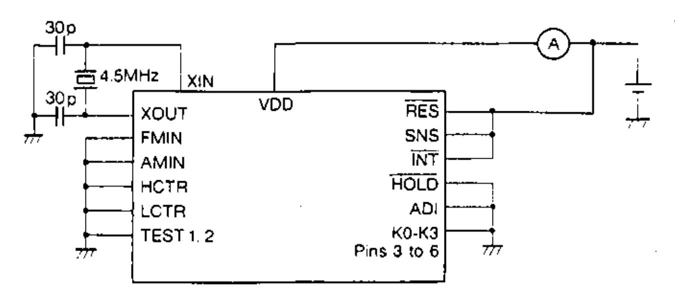
					min	typ	max	unit
Supply Voltage	V_{DD} (1)	PLL operating mode *1			4.5		5.5	V
	V_{DD} (2)	CLOCK operating mode, PLL stopped *2			3.5		5.5	V
	V_{DD} (3)	Memory hold *3			1.3		5.5	V
'H'-Level Input Voltage	V_{IH} (1)	REMO,$\overline{STEREO}$,K5,K4			0.7V_{DD}		5.5	V
	V_{IH} (2)	$\overline{RES}$,$\overline{INT}$,			0.8V_{DD}		5.5	V
	V_{IH} (3)	SNS			2.5		5.5	V
	V_{IH} (4)	K0,K1,K2,K3			0.6V_{DD}		V_{DD}	V
	V_{IH} (5)	CE,DO,CLK,IFCNT,SW1/VU, SW2/VD,MO/ST,MUTE			0.7V_{DD}		V_{DD}	V
	V_{IH} (6)	$\overline{HOLD}$			0.8V_{DD}		8.0	V
'L'-Level Input Voltage	V_{IL} (1)	REMO,$\overline{STEREO}$,K5,K4			0		0.3V_{DD}	V
	V_{IL} (2)	$\overline{RES}$,$\overline{INT}$,$\overline{HOLD}$			0		0.2V_{DD}	V
	V_{IL} (3)	SNS			0		1.3	V
	V_{IL} (4)	K0,K1,K2,K3			0		0.2V_{DD}	V
	V_{IL} (5)	CE,DO,CLK,IFCNT,SW1/VU, SW2/VD,MO/ST,MUTE			0		0.3V_{DD}	V
Input Frequency	f_{IN} (1)	XIN			4.0	4.5	5.0	MHz
	f_{IN} (2)	FMIN	V_{IN} (2)	V_{DD} (1)	10		130	MHz
	f_{IN} (3)	AMIN (MW,LW mode)	V_{IN} (4)	V_{DD} (1)	0.5		10	MHz
	f_{IN} (4)	AMIN (SW mode)	V_{IN} (5)	V_{DD} (1)	2.0		40	MHz
	f_{IN} (5)	HCTR (FMIF)	V_{IN} (6)	V_{DD} (1)	0.4		12	MHz
	f_{IN} (6)	LCTR (AMIF)	V_{IN} (7)	V_{DD} (1)	100		500	kHz
Input Amplitude	V_{IN} (1)	XIN			0.50		1.5	Vrms
	V_{IN} (2)	FMIN			0.10		1.5	Vrms
	V_{IN} (3)(4)	AMIN (MW,LW mode)			0.10		1.5	Vrms
	V_{IN} (5)(6)	HCTR,LCTR			0.10		1.5	Vrms
Input Voltage Range	V_{IN} (7)	$\overline{SD}$			0		V_{DD}	V

Refer to the item "Relationship of set type, power source and current" for *1, *2 and *3.

Electrical Characteristics/under the allowable operating conditions			min	typ	max	unit
Hysteresis Width	V_H	$\overline{RES}$,$\overline{HOLD}$,$\overline{INT}$	0.1 V_{DD}			V
Reject Pulse Width	P_{REJ}	SNS			50	μs
'H'-Level Input Current	I_{IH} (1)	$\overline{INT}$,$\overline{HOLD}$,$\overline{RES}$,$\overline{SD}$,SNS,REMO, $\overline{STEREO}$,K5,K4,V_I=5.5V			30	μA
	I_{IH} (2)	XIN,V_I=V_{DD}=5.0V	2.0	5.0	15	μA
	I_{IH} (3)	FMIN,AMIN,HCTR,LCTR, V_I=V_{DD}=5.0V	4.0	10	30	μA
	I_{IH} (4)	K0,K1,K2,K3,V_I=V_{DD}=5.0V		50		μA
'L'-Level Input Current	I_{IL} (1)	V_I=V_{SS}			3.0	μA
	I_{IL} (2)	V_I=V_{SS}	2.0	5.0	15	μA
	I_{IL} (3)	V_I=V_{SS}	4.0	10	30	μA
Input Floating Voltage	V_{IF}	K0,K1,K2,K3			0.05 V_{DD}	V
Pull-down Resistance	R_{PD}	K0,K1,K2,K3	75	100	200	KΩ
Output OFF-State Leakage Current (High)	I_{OFFH} (1)	EO1,EO2,V_0=V_{DD}		0.01	10	nA
	I_{OFFH} (2)	T0 to T7,STB,AMUTE,PWROUT,NARROW, IFCNT,CLK,DO,CE,MUTE,MO/ST,SW1/VU, SW2/VD:V_O=V_{DD}			3.0	μA
	I_{OFFH} (3)	V_{OL},$\overline{FM}$,$\overline{MW}$,$\overline{LW}$,V_O=13V			5.0	μA
Output OFF-State Leakage Current (Low)	I_{OFFL} (1)	EO1,EO2,V_O=V_{SS}		0.01	10	nA
	I_{OFFL} (2)	T0 to T7,STD,AMUTE,PWROUT,NARROW, IFCNT,CLK,DO,CE,MUTE,MO/ST,SW1/VU, SW2/VD			3.0	μA
'H'-Level Output Voltage	V_{OH} (1)	T0 toT7,I_O=1mA	V_{DD}−2.0	V_{DD}−1.0	V_{DD}−0.5	V
	V_{OH} (2)	CLK,DO,CE,MUTE,MO/ST, SW1/VU,SW2/VD:I_O=1mA	V_{DD}−1.0			V
	V_{OH} (3)	EO1,EO2:I_O=500μA	V_{DD}−1.0			V
	V_{OH} (4)	XOUT:I_O=200μA	V_{DD}−1.0			V
	V_{OH} (5)	S1 to S28:I_O=−0.1mA	V_{DD}−1.0			V
	V_{OH} (6)	NARROW,PWROUT,AMUTE, STB:I_O=5mA	V_{DD}−1.0			V
	V_{OH} (7)	COM1,COM2:I_O=20μA	V_{DD}−0.7	V_{DD}−0.5	V_{DD}−0.35	V
'L'-Level Output Voltage	V_{OL} (1)	T0 to T7:I_O=1mA	0.5	1.0	2.0	V
	V_{OL} (2)	CLK,DO,CE,MUTE,MO/ST,SW1/VU, SW2/VD:I_O=1mA			1.0	V
	V_{OL} (3)	EO1,EO2:I_O=500μA			1.0	V
	V_{OL} (4)	XOUT:I_O=200μA			1.0	V
	V_{OL} (5)	S1 to S28:I_O=0.1mA			1.0	V
	V_{OL} (6)	NARROW,PWROUT,AMUTE, STB:I_O=5mA			1.0	V
	V_{OL} (7)	COM1,COM2:I_O=20μA	0.35	0.5	0.7	V
	V_{OL} (8)	VOL,$\overline{FM}$,$\overline{MW}$,$\overline{LW}$:I_O=5mA	0.75 (150Ω)		2.0 (400Ω)	V
'M'-Level Output Voltage	V_M (1)	COM1,COM2,V_{DD}=5.0V,I_O=20μA	2.0	2.5	3.0	V
Supply Current	I_{DD} (1)	V_{DD} (1),f_{IN} (2)=130 MHz, PLL operating mode*4		15	25	mA
	I_{DD} (2)	V_{DD} (2),CLOCK operating mode (PLL stopped,HOLD mode,Fig.1)*5		2	3	mA
	I_{DD} (3)	V_{DD}=5.5V,OSC stopped, Ta=25°C,*6 (Backup mode,Fig.2)			5	μA
		V_{DD}=2.5V,OSC stopped,Ta=25°C, (Backup mode,Fig.2)			1	μA

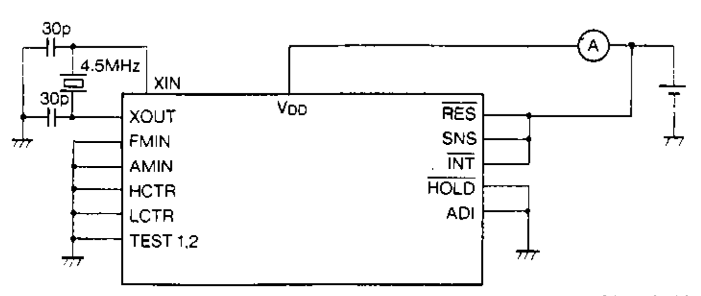
Refer to the item "Relationship of set type, power source and current" for *4, *5 and *6.

Unit (capacitance: F)



Note) Pins 7 to 30, PH, S1 to S28, COM 1, 2: Open

Fig. 1 I_{DD} (2) at HOLD Mode



Note) K0 to K3, pins 7 to 30, S1 to S28, COM 1, 2: Open

Fig. 2 I_{DD} (3) at Backup Mode

Unit (capacitance: F)

Set function grouping

Function	POWER SW	
	Tact switch usage	Mechanical switch usage
Remote controller	○	×
Timer and clock	○	×
Electronic volume	○	○
Function switch	○	○

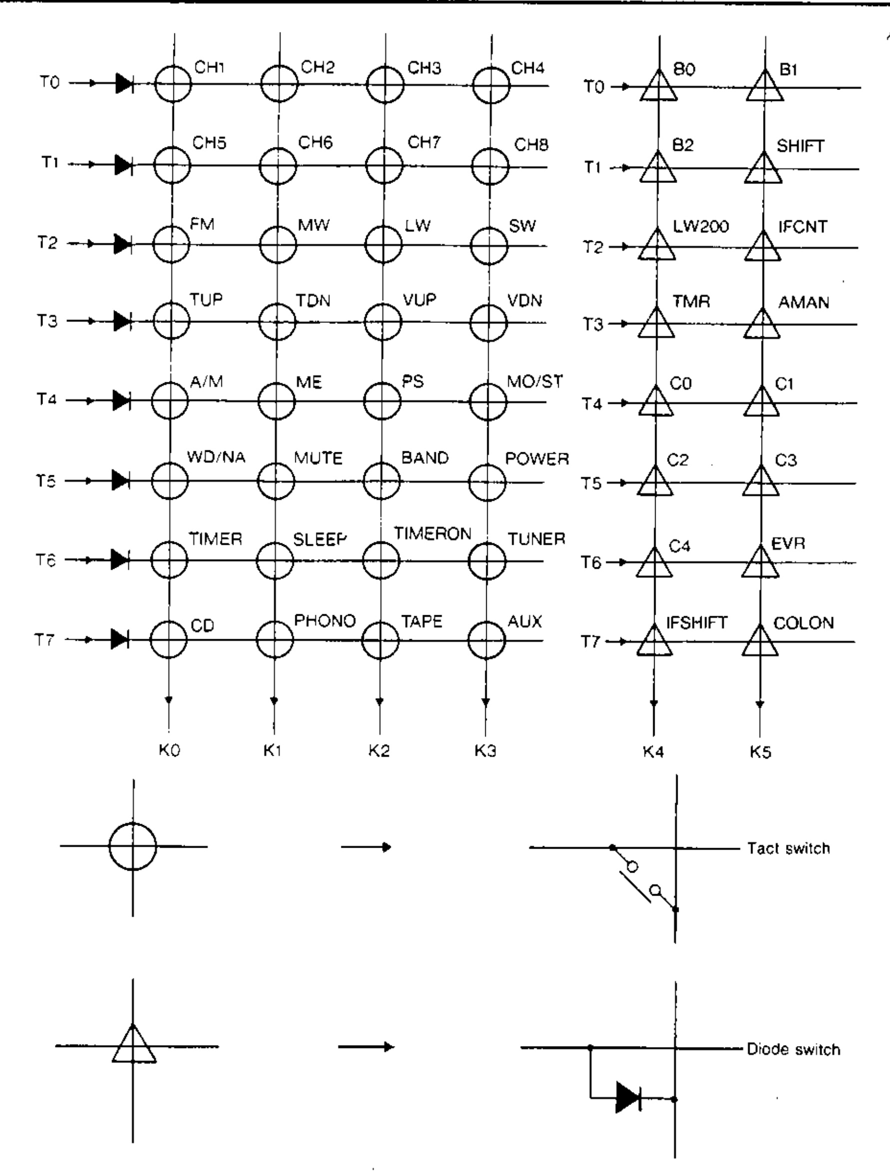
○..... Available
×..... Not available

Relationship of set type, power source and current

Set \ Status		When power is on		When power is off	When AC power is off
		Radio mode is on	Other than radio mode		
Power switch tact	With clock	V_{DD} (1) I_{DD} (1)	V_{DD} (2) I_{DD} (2)	V_{DD} (2) I_{DD} (2)	V_{DD} (3) I_{DD} (3)
	Without clock	V_{DD} (1) I_{DD} (1)	V_{DD} (2) I_{DD} (2)	V_{DD} (2) I_{DD} (2)	V_{DD} (3) I_{DD} (3)
Power switch mechanical	Without clock	V_{DD} (1) I_{DD} (1)	V_{DD} (2) I_{DD} (2)	V_{DD} (3) I_{DD} (3)	V_{DD} (3) I_{DD} (3)

Note) Refer to the Electrical characteristic reference for V_{DD} (1) – (3)

3. Key Matrix

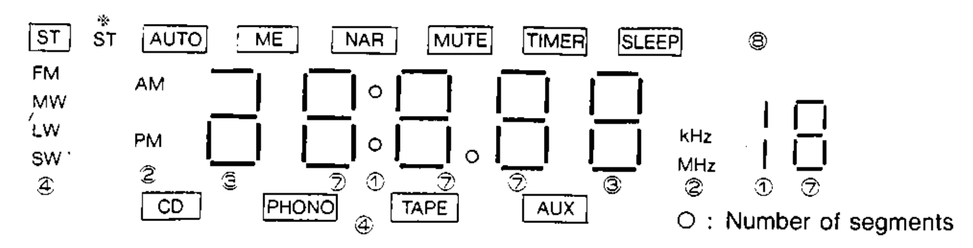


● Description of diode matrix (DIMRX) 0: Without diode 1: With diode

Name	Description	
B0 to B2	See the list of receiving frequency.	
SHIFT	0	Selection of MW, LW, SW without ( )
	1	Selection of MW, LW, SW in ( )
LW200	0	Selection of 100Hz for USA FM, absence of LW for others
	1	Selection of 200Hz for USA FM, presence of LW for others
IFCNT	0	Auto tuning without IF count (not applicable to LW)
	1	Auto tuning with IF count
TMR	0	Without timer CLOCK function
	1	With timer CLOCK function
AMAN	0	Manual tuning operation only
	1	Auto/manual tuning operation
C0 to C4	Setting of (C0,C1,C2,C3,C4)=(※)	
IFSHIFT	0	AM (MW, LW, SW) IF is set to 450kHz for all destinations.
	1	AM (MW,LW) IF, except SW and 10kHz-MW, is set to 468 kHz.
COLON	0	Always lighted
	1	Flashing at a 1Hz rate
EVR	0	Electronic volume timer correction mode: available
	1	Electronic volume timer correction mode: not available

※ See "Note" in Sample Application Circuit 4 (page 20).

4. Display



※: ST displays when tuned to an FM station and $\overline{\text{STEREO}}$ is held LOW.

Display font 0 1 2 3 4 5 6 7 8 9

5. Key Description

- CH1 to CH8

Key for writing/calling preset channels 1 to 16 (FM), 1 to 8 (AM). CH1 key, CH2 key correspond to channel 1/9, 2/10, respectively. For example, when you push CH1 key and release it within 0.5 second, CH1 is called; and when released in 0.5 second or more, CH9 is called.
When you push ME key, P1 is displayed on the frequency display area and CH1 to 8 may be written for 5 seconds. If you push ME key once again within 5 seconds, P2 is displayed and CH9 to 16 may be written. When you push any one key of CH1 to CH8, your desired channel is written in a specified memory.

		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	
8 channels	(Mode 1)	1	2	3	4	5	6	7	8	.... P1
	(Mode 2)	9	10	11	12	13	14	15	16	.... P2

- ME

① Used to write a new channel in the preset memory. When you push this key once, P1 (mode 1) is specified. When you push twice, P2 (mode 2) is specified. When you push once again, P1 returns.
The write enable mode is released automatically 5 seconds after this key pushed.

② When you push this key together with TIMER key, the timer setting mode (time setting mode) is entered.

- A/M (AMAN DIMRX=1)

Key for selecting the auto/manual tuning mode. Each time you push this key, the mode is switched as auto → manual → auto.... AUTO display flashes at the auto mode.

- TUP TDN

① Manual mode
Each time you push these keys, the channel No. goes up/down by one. When you hold these keys pushed for 500ms or more, the channel No. goes up/down at a 60ms/step rate.

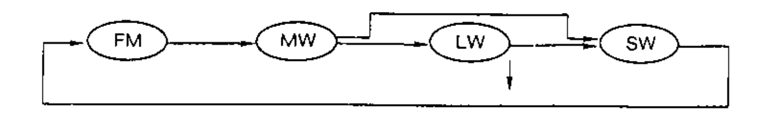
② Auto mode (AMAN DIMRX=1)
A broadcasting station is searched automatically in an up/down direction and a receiving frequency is held. If you hold this key pushed when the receiving frequency is reached, no auto stop occurs but a temporary stop (500ms) occurs. The searching rate is 60ms/step.

- FM MW LW SW

Key for band selection

- BAND

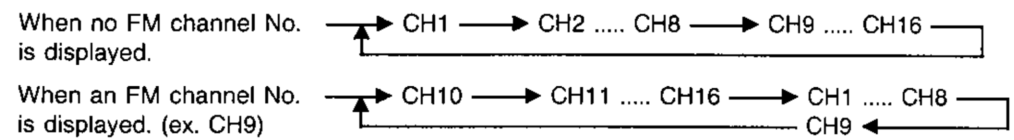
Key for band selection. Each time you push this key, band switching occurs.



Continued on next page.

● PS

Key for preset scanning. When you push this key, the channel No. is changed in the order of increasing channel No. beginning with a channel No. currently displayed. If no channel No. is displayed, the channel No. is changed from CH1. If there is a channel that can be received during preset scanning ($\overline{SD}$="L"), a sound is generated for 5 seconds and if there is no channel that can be received, the channel No. is displayed for 1 second with no sound generated and the channel No. is changed to the next one. The channel No. flashes at a 1Hz rate during preset scanning.



The preset scanning mode is released by pushing this key twice.

● MO/ST, WD/NA, MUTE

Key	Description	Display		Output
MO/ST	Effective at FM mode only For monaural/stereo selection	ST	Lighted	L
			Unlighted	H
WD/NA	Effective at FM mode only For wide/narrow band selection	NAR	Lighted	H
			Unlighted	L
MUTE	Effective in all modes with power ON. Unlighted and output "L" when power OFF is changed to power ON during the lighted state and when volume up or down is activated.	MUTE	Lighted	H
			Unlighted	L

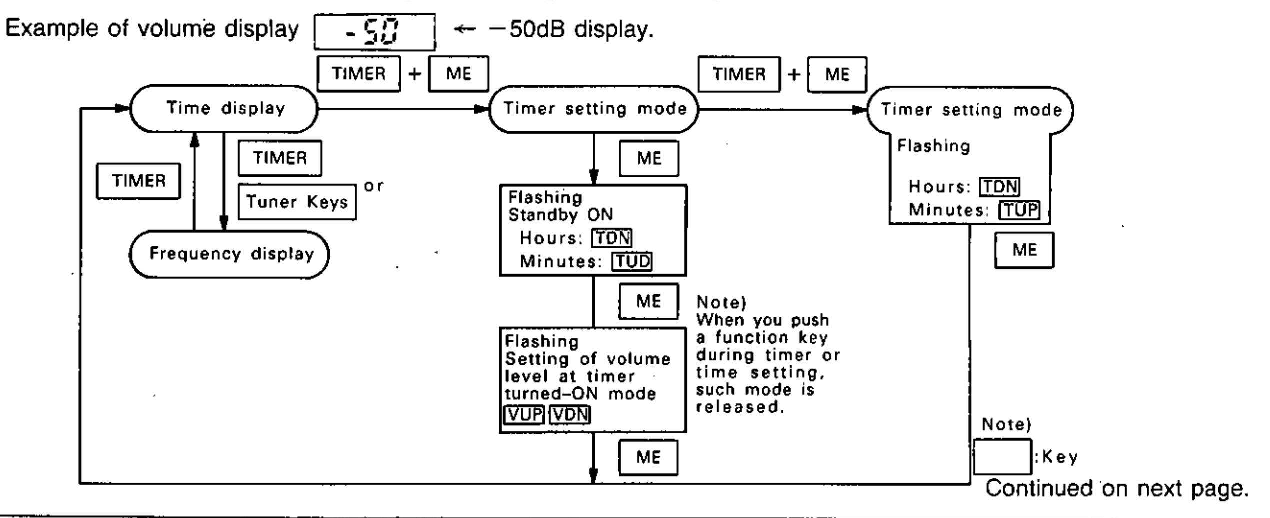
● POWER

Switch for turning ON/OFF the power supply of LC7230-8272-applied equipment. Each time you push this key, the level at output pin PWR OUT is switched as H → L → H.... The volume level at the power-ON mode is the same as for the previous power-OFF mode.

● TIMER (Causes turn-ON mode only. Not cause turn-OFF mode "ONCE" timer only.)

Key for providing time display at the timer setting mode, time setting mode or frequency display mode. When you push this key together with ME key, the timer setting mode is entered; and when you release the two keys once and push them again simultaneously, the time setting mode is entered.
When you push ME key in the timer setting mode, the timer time setting is enabled with the timer time flashing and the standby mode is entered. TDN key and TUP key are used for hours setting and minutes setting, respectively. These settings are made in an up direction only. Each time you push TDN key or TUP key, the display contents increment by one. When you hold TDN key or TUP key pushed for 500ms or more, the display contents advance at a 4 hours/second rate or 8 minutes/second rate, respectively.
When you push ME key after completion of setting, a volume level at the timer turned-ON mode can be set. A digitally displayed volume level at this moment is the same as for the previously set value. The setting range is from −16dB to −80dB. The volume level at the initial mode is −50dB.
When you push ME key after completion of setting, the time display mode returns. When you wish to check the set time only at the timer setting mode, push ME key twice to return the mode to the timer display mode.
Next, in the time setting mode the time setting is enabled with the time display flashing. The setting method is the same as for the timer setting mode. When you push ME key after completion of setting, the second display is cleared to zero and the time display mode returns.
When power is turned ON at the initial mode, the time setting mode is entered.
When you push a function key during timer setting or time setting, such mode is released.

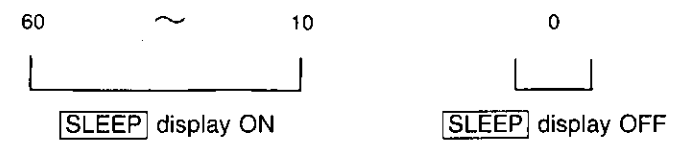
Example of volume display [-50] ← −50dB display.



Continued on next page.

● [SLEEP]

Key for sleep time setting. When you push this key in the [SLEEP] display OFF state, the [SLEEP] display is turned ON and 60 (minutes) is displayed. Each time you push this key, 60 decrements in units of 10 minutes. When 0 is reached, [SLEEP] display is turned OFF and the sleep time setting mode is released. The previous mode returns 5 seconds after a sleep time is set to a specified value ([SLEEP] key is released).



When you push the [SLEEP] key while in clock display or frequency display, the remaining sleep time is displayed. 5 seconds after releasing the key the previous status will return.

● [TIMER ON]

Each time you push this key, [TIMER] display is turned ON/OFF. When turned ON, the timer operation is carried out; and when turned OFF, no timer operation is carried out.

● [TUNER]

When you push this key in the state where the CD, PHONO, TAPE, AUX functions are provided, the function is switched to TUNER and the frequency display is provided.

● [CD]

When you push this key in the state where the PHONO, TAPE, AUX, TUNER functions are provided, data is transferred to the LC7821(N), the function is switched to CD, and [CD] display is provided. You can also use this key for the CD power supply control signal and LED function display.

● [PHONO]

When you push this key in the state where theTAPE, AUX, TUNER, CD functions are provided, data is transferred to the LC7821(N), MLC74HC375, the function is switched to [PHONO] display is provided.

● [TAPE]

When you push this key in the state where the AUX, TUNER, CD PHONO functions are provided, data is transferred to the LC7821(N), MLC74HC375, the function is switched to [TAPE], and TAPE display is provided.

● [AUX]

When you push this key in the state where the TUNER, CD PHONO functions are provided, data is transferred to the LC7821(N), MLC74HC375, the function is switched to AUX and [AUX] display is provided.

● [VUP] [VDN]

Keys for increasing/decreasing the electronic volume control level. Each time you push these keys, the level goes up/down by 1dB. When you hold theses keys pushed for 500ms or more, the level goes up/down at a 150ms/dB rate.
The level displayed for the LB1417 is shown below.

Level	1st Dot	2nd Dot	3rd Dot	4th Dot	5th Dot	6th Dot	7th Dot
Attenuation	−80dB	−52dB	−38dB	−26dB	−18dB	−10dB	−4dB

For specifications with no SW band, the volume increase/decrease signal is delivered at the SW1,2 pins.

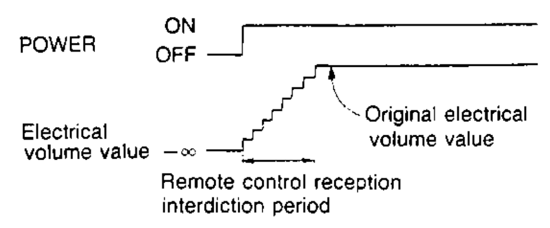
5. Remote Control

(1) The keys other than shown below are the same as for LC7230-8272-applied audio equipment.

Key Name	Description	Pin	Output Waveform
PLAY/PAUSE	PLAY/PAUSE key for CD	NARROW	Single pulse min 50m
STOP	STOP key for CD	IFCNT	
NEXT	NEXT key for CD	$\overline{MW}$	Continuous pluse min 50ms
BACK	BACK key for CD	$\overline{LW}$	
CHUP	Each time you push this key, the channel No. goes up by one. When you hold this key pushed for 0.7 second or more, the channel No. is switched every 0.4 second. If there is no channel No. Present, the channel No. starts with CH1.		

(2) Remote control reception interdiction period.

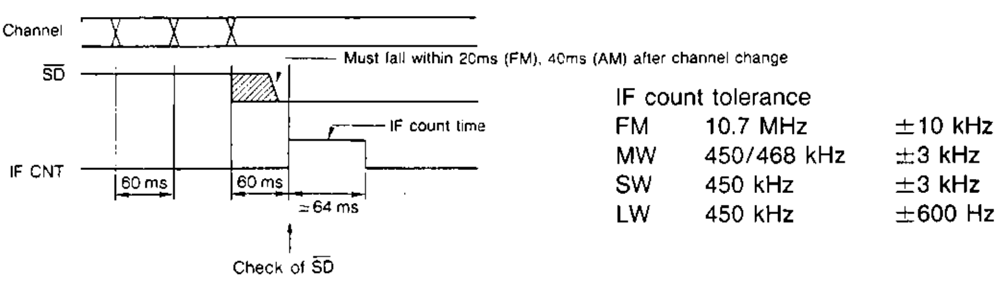
① After power on, this unit does not reveive the remote control function for the period in which the volume value returns from $-\infty$ to the original value. (When DIMRX of TMR is 1.)



② After turning the power on, unable to receive for 2 seconds. (When DIMRX of TMR is 0)

6. Timing Description

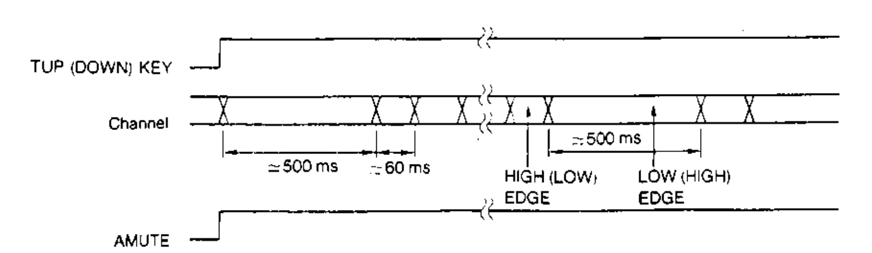
(1) Auto up/down mode



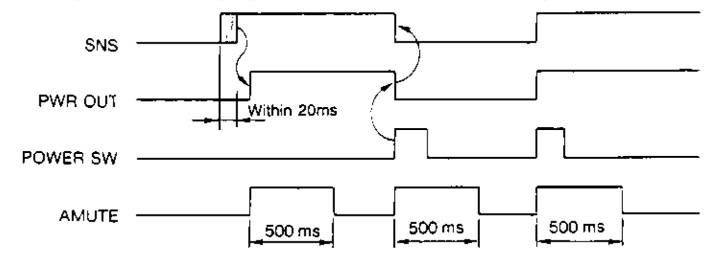
IF count tolerance

FM	10.7 MHz	±10 kHz
MW	450/468 kHz	±3 kHz
SW	450 kHz	±3 kHz
LW	450 kHz	±600 Hz

(2) Manual



(3) Power ON mode (See Sample Power Supply Connection (1).) (Including the timer, sleep timer modes)

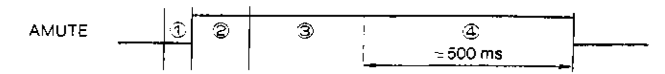


(Note) 1. Data of $-\infty$ is sent to the LC7535 immediately before power is turned OFF.
2. Data of $-\infty$ is sent to the LC7535 immediately after power is turned ON.
3. When the SNS pin is brought to "H" level after power is turned ON, the original volume level returns at a 38ms/dB rate.

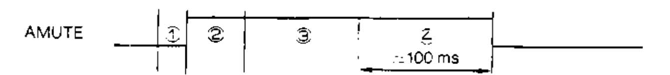
(4) Audio mute (AMUTE)

① Key chattering eliminating time (approximately 40ms)
② Audio pre-mute time (approximately 50ms)
③ Interstation wait and data transfer to PLL (20ms to 80ms)
④ Audio post-mute time
⑥ Processing required for the LC7535, LC7821(N), MLC74HC375, etc. (approximately 5ms)

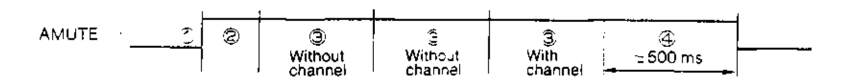
a. Band select mode, present channel read mode



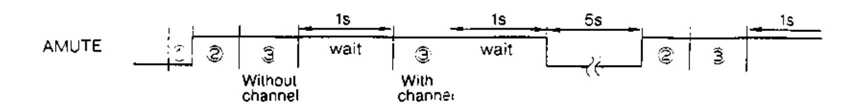
b. Manual up/down mode



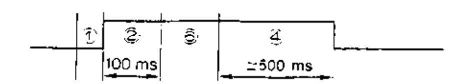
c. Auto up/down mode



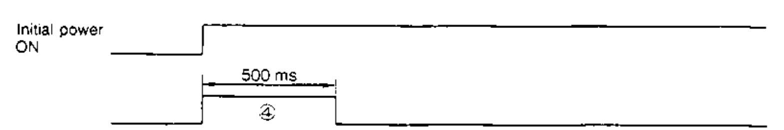
d. PS mode



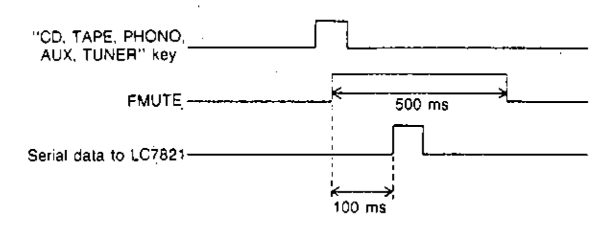
e. Function select mode (also applicable to FMUTE of the MLC74HC375(N))



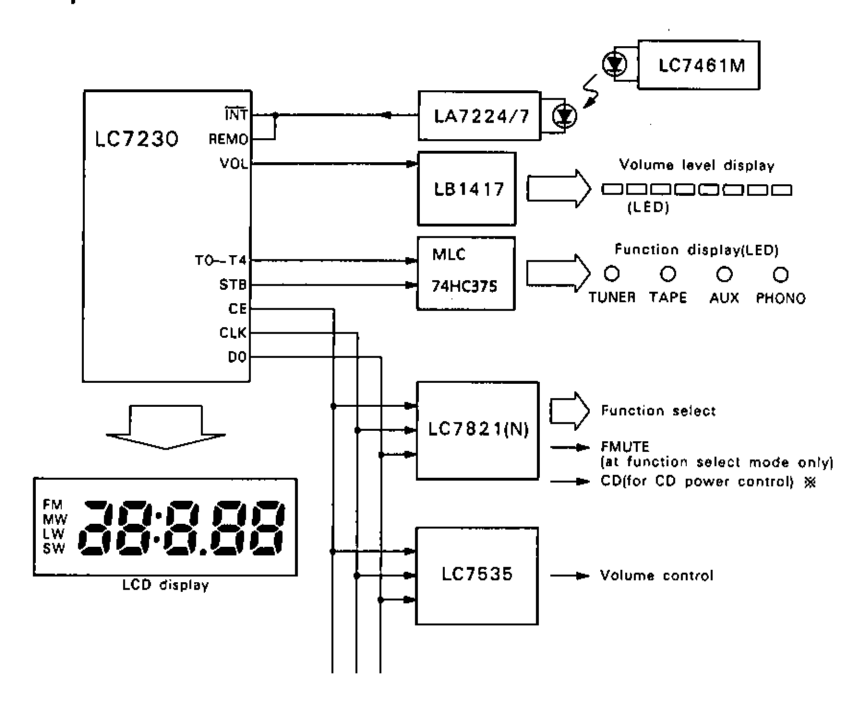
f. Initial power-ON mode



(5) FMUTE (MUTE for Switching Functions)



7. Connection with Peripheral ICs



※ Note:
CD output and NEXT($\overline{MW}$), BACK($\overline{LW}$) output when CD function is selected is changed as following. At this time in order to prevent CD error of point (A), it is necessary to delay CD output.

8. Pin Description

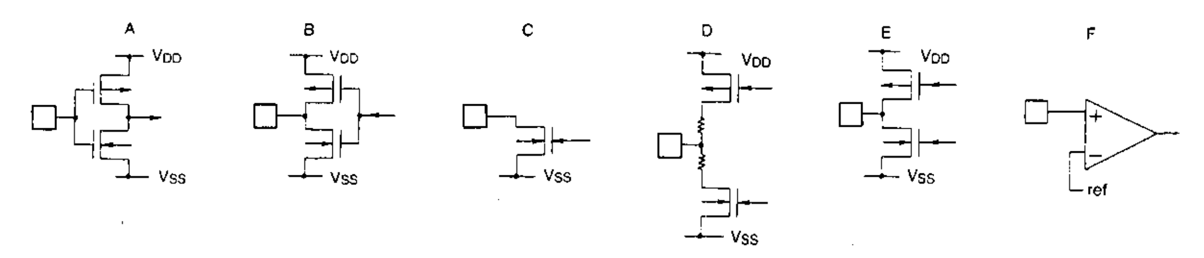
Pin Name	Pin No.	Description	Active	I/O	I/O Configu-ration
XIN	1	4.5 MHz crystal oscillation pins	—	I	—
XOUT	80			O	
TEST1	2	Must be connected to V_{SS}.	—	I	—
TEST2	79				
REMO	3	Remote control signal input pin. Used with $\overline{INT}$ pin. When no remote control is not in use, pulled up to V_{DD} through a resistor.	L	I	A
$\overline{STEREO}$	4	When the stereo signal is brought to "L" level, "ST" LCD indicator light goes ON.	L	I	A
VOL	7	The LB1417 is connected to this pin to provide the electronic volume control level display.	—	O	C
$\overline{FM}$	8	Used to select the power supply for each band.	L	O	C
$\overline{MW}$	9	Used to select the power supply for each band. / CD NEXT signal output			
$\overline{LW}$	10	Used to select the power supply for each band. / CD BACK signal output			
SW1/VU	11	Spec. With no SW band: "H" output only when VUP key is pushed	H	O	B
SW2/VD	12	Spec. With no SW band: "H" output only when VDN key is pushed			
MO/ST	13	Output pin for monaural "H"/stereo "L" selection	H	O	B
MUTE	14	"L" level at power-ON mode. Each time you push [MUTE] key at the power-ON mode, "H"/"L" toggle operation is carried out.	H	O	B
CE DO CLK	15 16 17	Serial data line of the LC7535, LC7821 (N)	H H ↑	O	B
IFCNT	18	Signal to output the IF signal. STOP signal output at the CD mode	H	O	B

Continued on next page.

Continued from preceding page.

Pin Name	Pin No.	Description	Active	I/O	I/O Configu-ration
NARROW	19	Pin for IF narrow band "H"/wide band "L". PLAY/PAUSE signal output at the CD mode	H	O	B
PWR OUT	20	Power control pin	H	O	B
AMUTE	21	Audio muting pin	H	O	B
STB	22	Pin for strobe of data to the MLC74HC375. Connected to "CL"	H	O	B
T7	23	Data transfer to the MLC74HC375 ; Function display-TAPE	H	O	B
T6	24	Data transfer to the MLC74HC375 ; Function display-TUNER			
T5	25	Data transfer to the MLC74HC375 ; Function display-AUX			
T4	26	Data transfer to the MLC74HC375 ; Function display-PHONO			
T3 T2 T1 T0	27 28 29 30	Key scan output signal			
K3 K2 K1 K0	32 33 34 35	Key-in signal	H	I	A
K4 K5	6 5	Diode matrix input signal	H	I	A
S1 to S28	63 to 36	LCD segment driver pins	—	O	B
COM1 COM2	65 64	LCD common driver pins	—	O	D
$\overline{HOLD}$	67	When brought to "L" level, the backup mode is entered. A chattering of approximately 20ms is eliminated.	L	I	A
$\overline{SD}$	69	Signal to inform that a channel is received during auto tuning	L	I	F
HCTR	70	FM IF signal input pin	—	I	A
LCTR	71	AM IF signal input pin	—	I	A
SNS	72	When brought to "H" level, data is sent to the LC7821 (N), LC7535, MLC74HC375, LB1417. A chattering of approximately 20ms is eliminated.	H	I	A
FMIN	74	Local OSC input from FM VCO	—	I	A
AMIN	75	Local OSC input from AM VCO	—	I	A
EO1, 2	76 77	Phase comparator output signal	—	O	E
$\overline{INT}$	66	Remote control signal input pin. Used with REMO pin.	↓	I	A
V_{DD}	31 73	Power supply pin. Connected to +5V.	—	—	—
V_{SS}	76	Power supply pin. Connected to GND.	—	—	—
$\overline{RES}$	68	Must be connected to V_{DD}.	—	—	—

Pin input/output configuration

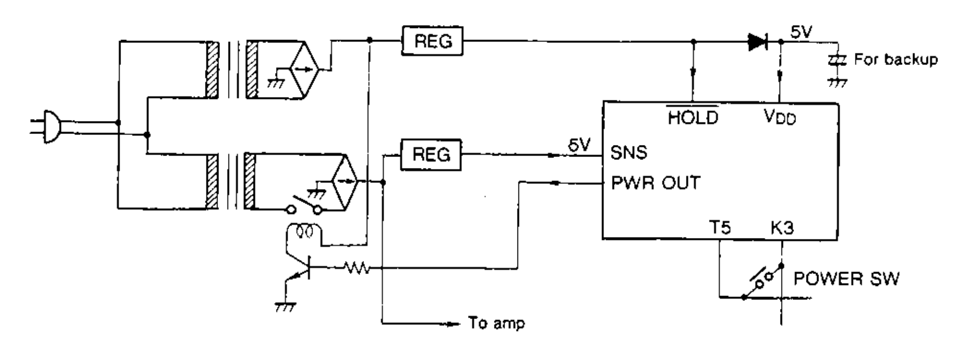


9. Band Power Supply Select Signal

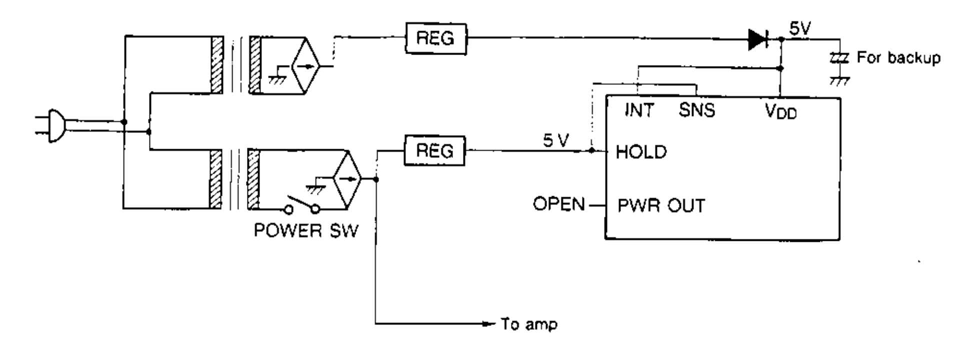
Band \ Pin	$\overline{FM}$	$\overline{MW}$	$\overline{LW}$	SW1	SW2
FM	L	H	—	—	—
MW	H	L	L	L	L
LW	H	L	H	L	L
SW1	H	L	H	H	L
SW2	H	L	H	H	H

10. Sample Power Supply Connections

(1) TMR DIMRX "0" "1" function possible
Use tact switch for power switch (when using the remote control, with timer, etc.)



(2) TMR DIMRX "0" use possible, "1" use not possible
Use mechanical switch for power switch, (when not using Remote Control, with Timer)



11. Initial Mode

- Function : TUNER
- Clock 12hr : 12:00 } Flashing Timer set value: 10:00
  24hr : 0:00
- Band : FM
- A/M : Manual (AMAN=1)
- Timer, sleep timer : Timer OFF
- Preset channel : None
- ME : OFF
- MO/ST : Stereo MO/ST pin="L"
- WD/NA : Wide WD/NA pin="L"
- Volume : −50dB
- Volume level at timer mode : −50dB
- Muting output : "L" level
- PWROUT : "L" level

12. Tracking Point

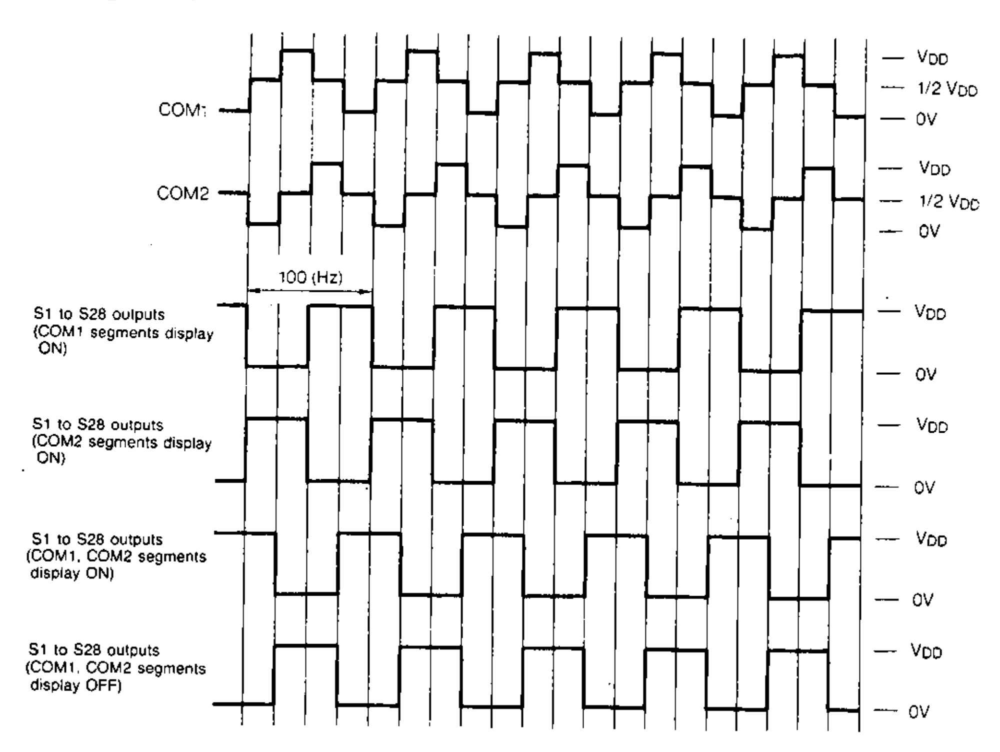
The following frequencies are loaded in each preset memory at the initial power-ON mode.

[FM:MHz, AM:kHz]

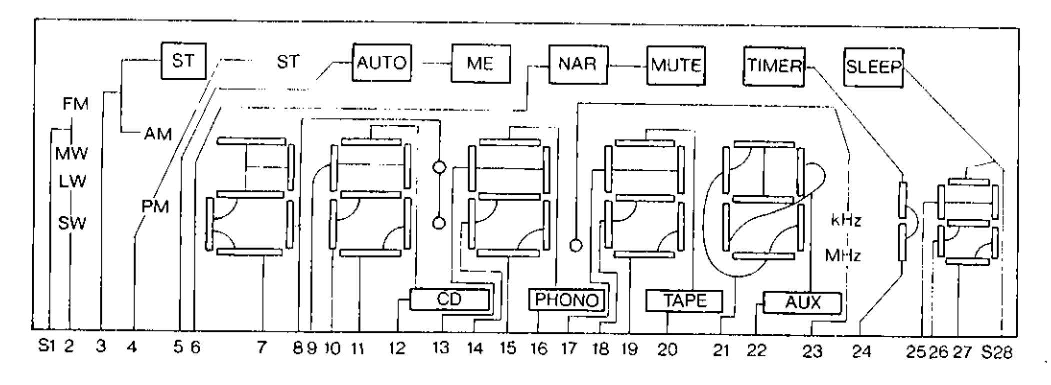
Area	Band	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	Diode Matrix $B_2B_1B_0$
JAPAN	FM	76.0	78.6	83.0	86.6	90.0	76.0	76.0	76.0	1 0 0
	MW	531	603	999	1404	1611 (1629)	531	531	531	
USA	FM	87.9	90.1	98.1	106.1	107.9	87.9	87.9	87.9	0 0 0 1 1 1
	MW	530	600	1000	1400	1610 (1720)	530	530	530	0 0 0
	MW	522	603	999	1404	1611 (1719)	522	522	522	1 1 1
EUROPE	FM	87.5	90.0	98.0	106.0	108.0	87.5	87.5	87.5	0 0 1
	MW/LW	531 (522)	603	999	1404	1602 (1611)	153 (146)	270	281 (290)	0 1 0 0 1 1
	MW/SW	↑	↑	↑	↑	↑	5800	9500	13500	0 1 0
	MW/SW	↑	↑	↑	↑	↑	5200	9500	13500	0 1 1
	MW/LW/SW	↑	↑	↑	↑	↑	153 (146)	270	281 (290)	0 1 0 0 1 1
S.AFRICA	FM	87.5	90.0	98.0	106.0	108.0	87.5	87.5	87.5	1 1 0 1 0 1
	MW/LW	531 (522)	603	999	1404	1602 (1611)	153 (146)	270	281 (290)	1 1 0
	MW/SW	↑	↑	↑	↑	↑	5800	9500	13500	1 0 1
	MW/LW/SW	↑	↑	↑	↑	↑	153 (146)	270	281 (290)	

Note 1) ( ): Value when diode matrix "SHIFT" is selected
2) CH9 to CH16 are loaded with low band edge at the FM mode.

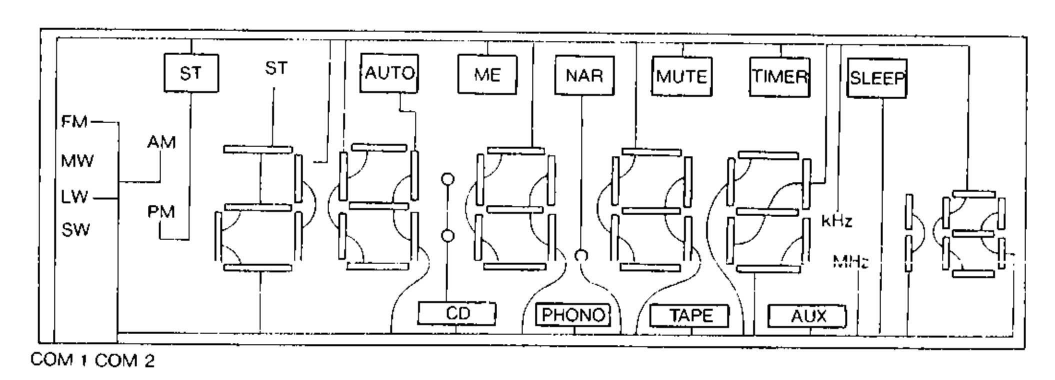
13. Waveforms on Segments, Common Pins



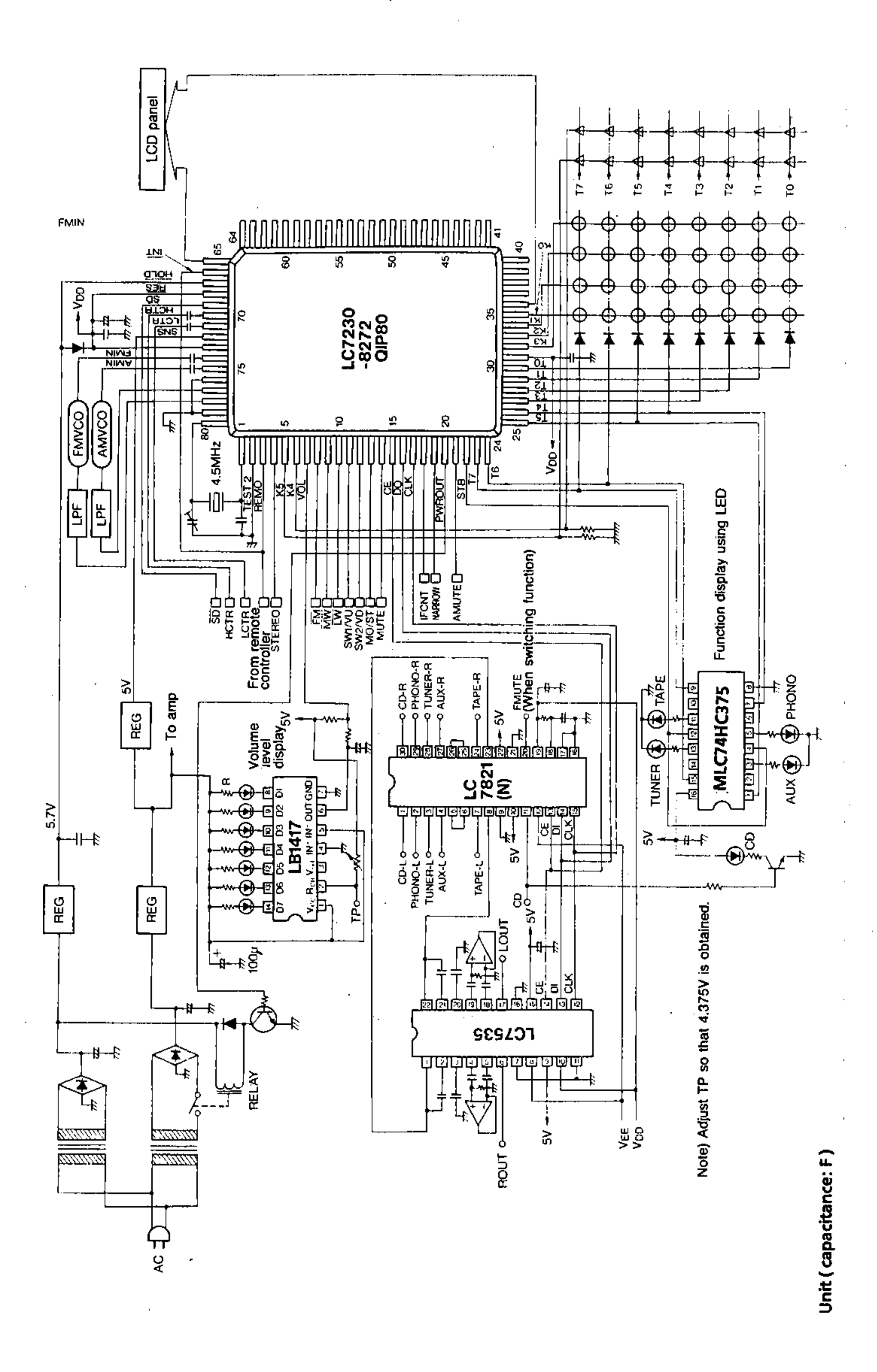
14. (1) Connection of Segments on Panel



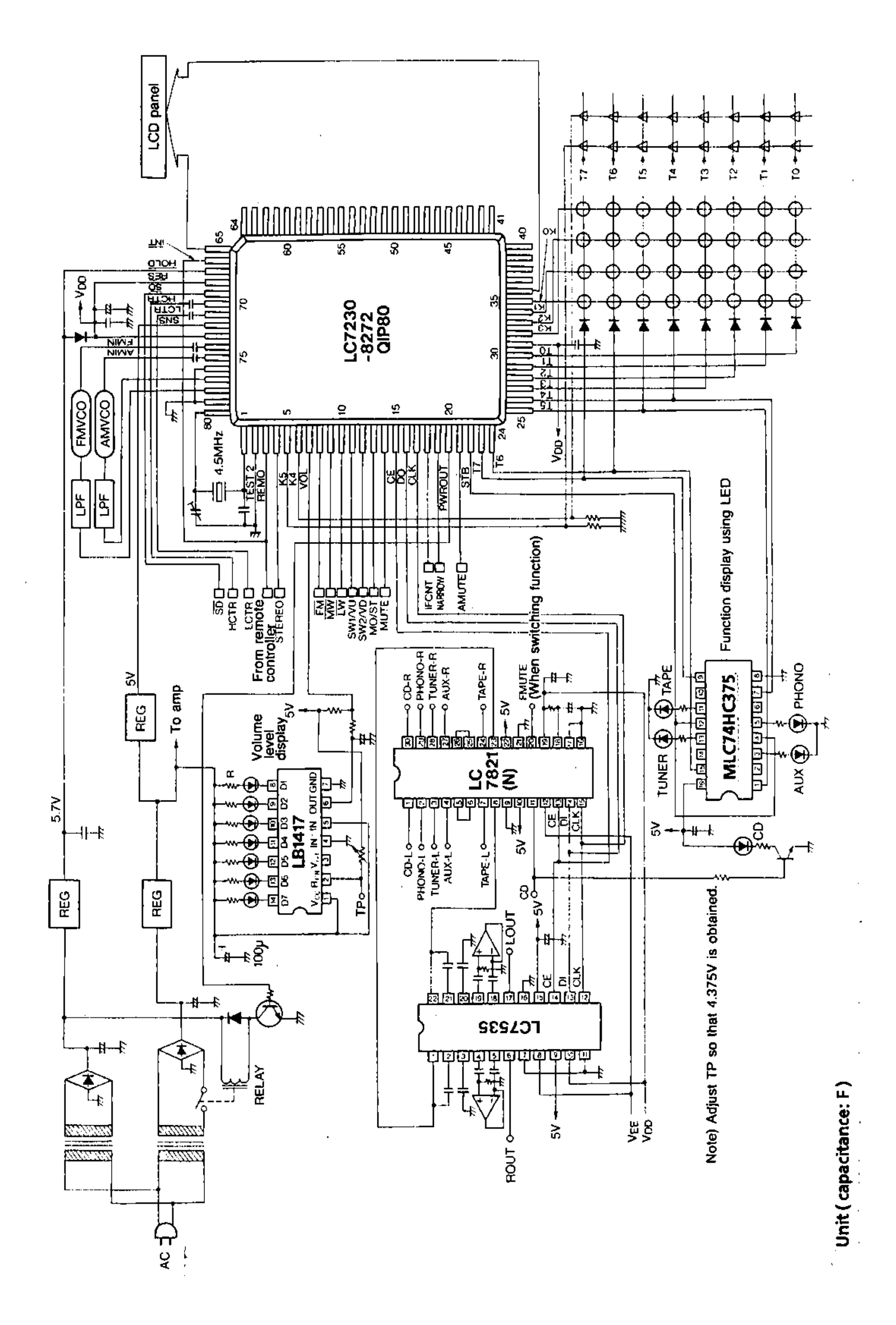
(2) Connection of Common Pins on Panel



Sample Application Circuit 1 (With remote controller, timer, function switches and electric volume)
Use tact switch for power switch



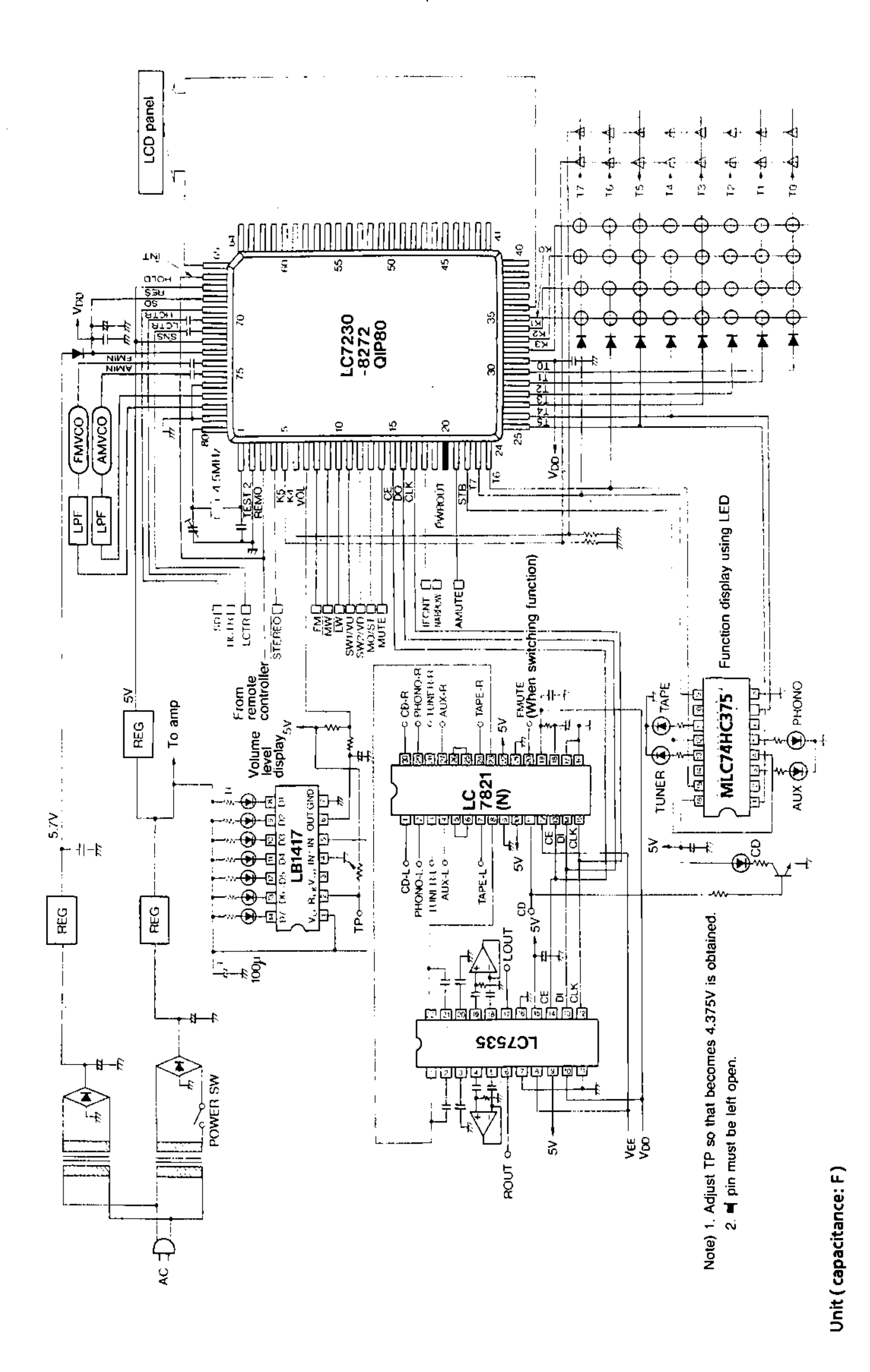
Sample Application Circuit 2 (With remote controller, timer, function switches and electric volume)
Use tact switch for power switch



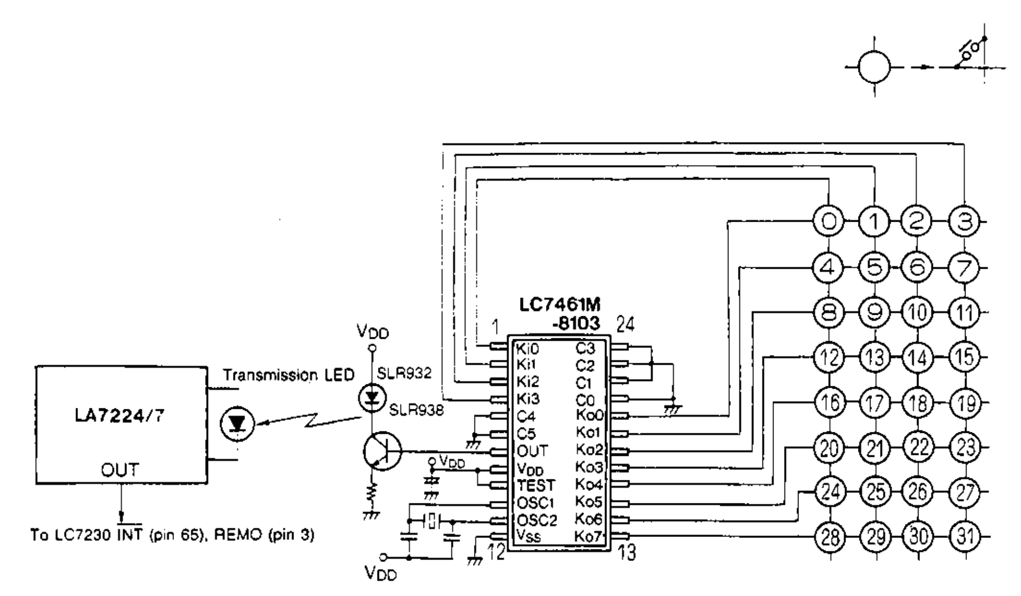
Note) Adjust TP so that 4.375V is obtained.

Unit (capacitance: F)

Sample Application Circuit 3 (With function switches and electric volume)
Use mechanical switch for power switch



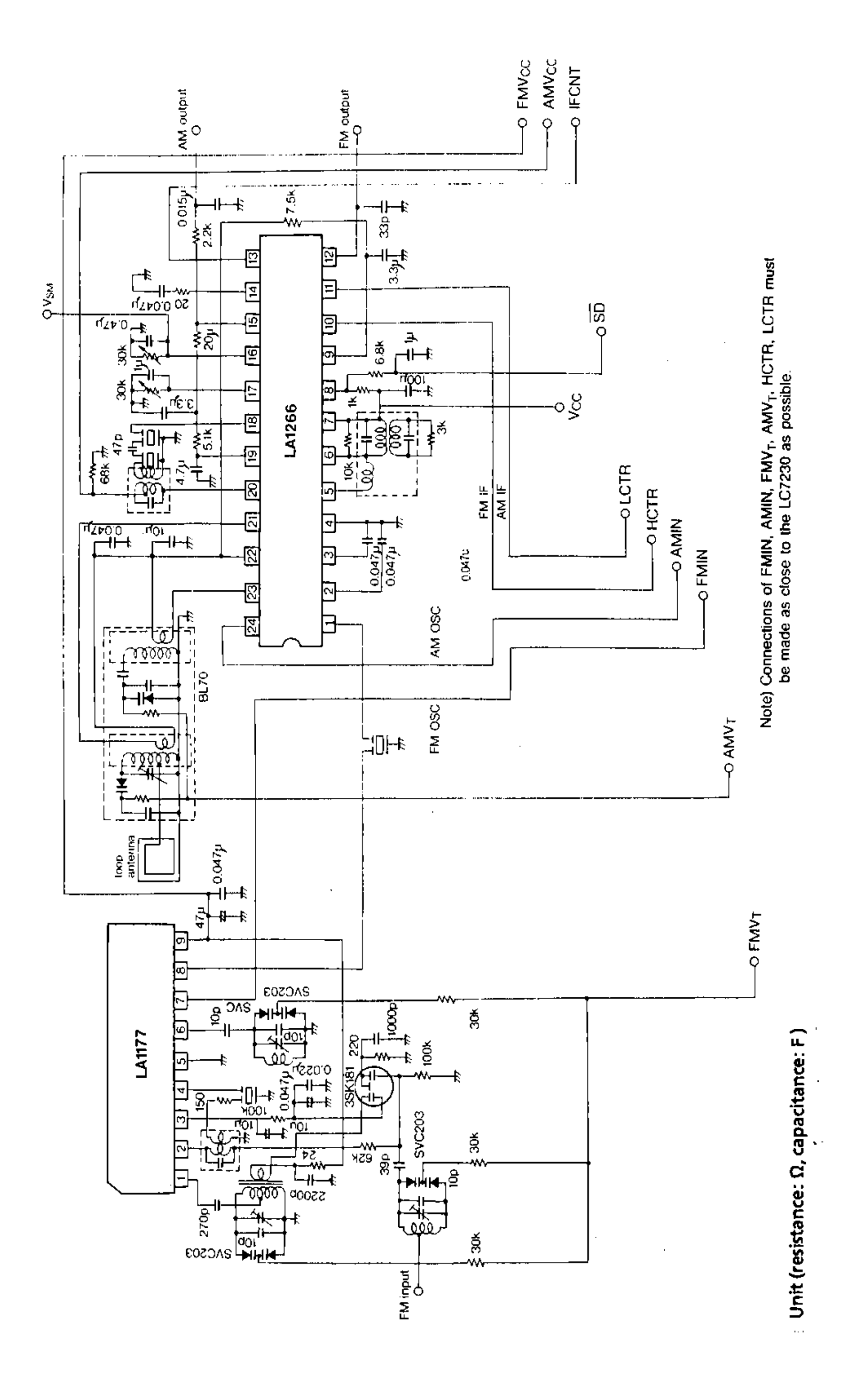
Sample Application Circuit 4



Note) The above connection of C0 – C5 is an experimental connection only.
For mass-production, other specifications authorized by Sanyo Electric Co., Ltd., are required.

No.	KEY	No.	KEY	No.	KEY	No.	KEY
0	CH1	8	FM	16	PLAY/PAUSE	24	BAND
1	CH2	9	MW	17	PS	25	POWER
2	CH3	10	LW	18	MO/ST	26	TIMER ON
3	CH4	11	SW	19	CHUP	27	TUNER
4	CH5	12	NEXT	20	TIMER	28	CD
5	CH6	13	BACK	21	SLEEP	29	PHONO
6	CH7	14	VUP	22	STOP	30	TAPE
7	CH8	15	VDN	23	MUTE	31	AUX

Sample Application Circuit 5 LA1177, LA1266



Custom Code of the LC7461M-8103

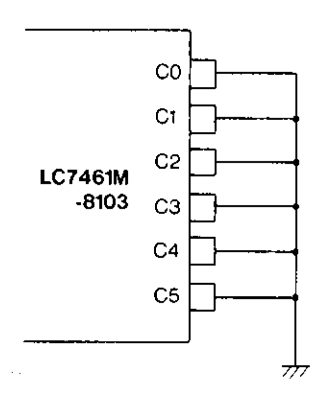
The LC7461M-8103 is a remote control signal transmission IC to be used in conjunction with the LC7230-8272.

The custom code of the LC7461M is such that the 7 bits are fixed by the internal metal mask and the remaining 6 bits are set using the IC pins.

Custom code 0100H is available for evaluation. When performing evaluation, the code of the LC7461M-8103, LC7230-8272 must be set to this code value.

When evaluation is acceptable, a custom code to be used must be assigned before mass production of equipment and your draft on remote control IC should be submitted.

How to set code 0100H for evaluation



Set C0 to C4 of the LC7230-8272 to 0.

When a custom code for mass production is assigned, C0 to C4 are set to 1 (connected to V_{DD}) or 0 (connected to V_{SS}) according to the specified code.

Note) A code of the LC7230-8272 is set according to 1 (with diode) and 0 (without diode).